DOCUMENT RESUME

ED 300 652 CE 051 354

AUTHOR Cox, Kenneth; Cheek, Gerald
TITLE Microcomputer Application Priorities of College Faculty in Vocational-Technical Education.
PUB DATE Dec 88
NOTE 19p.; Paper presented at the American Vocational Association Convention (St. Louis, MO, December 1988).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *College Faculty; *Computer Oriented Programs; Educational Needs; Graduate Students; Higher Education; *Microcomputers; Needs Assessment; Postsecondary Education; Student Attitudes; *Teacher Attitudes; *Teacher Education; *Vocational Education Teachers

ABSTRACT

A literature review revealed that few colleges of education offering courses in microcomputer applications are addressing the training needs of college professors and graduate students aspiring to faculty positions. A study was therefore conducted to define and prioritize microcomputer applications needed by college faculty in vocational-technical education. The study population consisted of 278 professional teacher educators from the member institutions of the University Council for Vocational Education. A 74 percent response rate (212 usable questionnaires) was achieved. Word processing was the most used application (91 percent), with only 1 in 10 teacher educators not using a computer for word processing. The next six most frequently used applications were statistical packages, disk operating system and other system commands, bibliographic search, database management, electronic spreadsheets, and desktop publishing packages. All seven of the most frequently used applications were ranked among the nine most important applications. No significant relationship existed between users' and nonusers' rankings of the applications. A portion of the study also addressed the perceived differences in the importance of computer applications and their use between the different service areas within vocational-technical and adult education. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED300652

MICROCOMPUTER APPLICATION PRIORITIES OF COLLEGE FACULTY IN VOCATIONAL–TECHNICAL EDUCATION

Presenters

Mr. Kenneth Cox
Curriculum Writer
Department of Technological & Adult Education
University of Tennessee, Knoxville

Dr. Gerald Cheek
Professor & Head
Department of Technological & Adult Education
University of Tennessee, Knoxville

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

D Cheek

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Presented at the
American Vocational Association Convention
December, 1988

CE051354

BEST COPY AVAILABLE

INTRODUCTION

The inauguration of the microcomputer in schools and colleges throughout the country has led to a need for new skill development among staff and faculty. This need for staff development has been described as "overwhelming" (Cheek & Campbell, 1984, p.51), "massive" (McHenry & Franklin, 1986, p. 173) and "necessary...to train students for a technologically evolving 'real world'" (Garson, 1985, p. 369). Battista and Krockover (1984) stated the need for faculty training in a penetrating manner: "It is becoming increasingly imperative that computer literate high school graduates entering college be taught by computer literate college professors" (p. 97).

While the definition of "computer literacy" has changed during the growth of hardware and software systems, the "ability to use quite a broad spectrum of computer tools for accessing and processing information" (King, 1985, p. 20) seems to be the direction in which we are heading. Questions arise, however, as to what microcomputer applications should be taught, what skills are needed and what level of proficiency is required. Indeed, the question arises as to what is currently being done to prepare our current and future faculty members of vocational-technical education to meet this challenge.

PROBLEM

A review of literature revealed that the majority of the graduate courses, offered in colleges of education, in microcomputer skills are directed toward preparing public school teachers. However, training needs of college professors and graduate students looking toward faculty positions are frequently overlooked. If today's faculty members in vocational-technical education, and those of tomorrow, are going to use and be teaching applications of microcomputers, they should receive needed skills during inservice and graduate studies.

PURPOSE

The purpose of this study was to define and prioritize microcomputer applications needed by college faculty in vocational-technical education. Identification of these applications could serve as the foundation for both competency-based faculty training programs and a guide for curriculum development for graduate education in computer applications. Additionally, the study determined the perceived differences in the importance of computer applications and their use between the different service areas within vocational-technical and adult education.

OBJECTIVES

In order to establish a data-based framework from which to design faculty and graduate student training programs, five objectives were established. The objectives of this study were:

1. To identify the microcomputer applications currently used by vocational-technical education faculty.
2. To identify perceived needs in microcomputer applications for adult and vocational-technical education faculty.
3. To prioritize identified microcomputer applications.
4. To determine differences in the use and perceived importance of microcomputer applications between faculty members in various service areas of vocational-technical education.
5. To recommend instructional content for graduate courses in microcomputer education that would be taken by future faculty in adult and vocational-technical education.

RATIONALE

The microcomputer, coupled with telecommunications and powerful software packages, has become the multipurpose tool of the information age. Word processors have replaced typewriters as the tool for producing text. The place of the adding machine has been usurped by the electronic spreadsheet. Index card files have been rendered obsolete by data base programs. The ability to electronically search large data bases in various parts of the country

has made the long hours spent in library stacks comparatively unproductive. Slatta (1986) described the relationship of the microcomputer to the role of faculty members as follows:

> Most university faculty members are both researchers and teachers. They must store and systematically retrieve efficiently voluminous research notes and bibliographical citations needed for individual (or cooperative) research projects. A second task is a pedagogical one—to train students in proper research methods with new microcomputer technology. (p. 307)

Microcomputers have rapidly changed the ways we access, treat and report textual and numeric data. The question this research sought to answer was: What is being done to prepare current and future faculty members to take advantage of the tool of the information age?

In adult and vocational-technical education this training need is doubly important. Current faculty need to be "brought up to speed" in the techniques for using microcomputer applications. Additionally, in order for new faculty members to achieve long term success in scholarly pursuits, they should be prepared with the needed skills for locating, accessing and analyzing information. Without data-based priorities of which microcomputer applications should be learned, much of this training could be of little use.

ASSUMPTIONS

Since this research utilized a researcher-generated questionnaire and may have involved variables beyond the control of the researcher, the following assumptions were made:

1. The software applications included in the instrument represented both an accurate and exhaustive listing.
2. The training needs for current vocational-technical faculty and those of future faculty (graduate students) are the same.

DELIMITATIONS

This study was concerned only with those microcomputing skills needed by current and future college faculty members in the field of professional vocational-technical teacher education.

This descriptive research employed a researcher-generated questionnaire to determine the current microcomputer applications being used and the perceived needs for training in microcomputer applications.

SUBJECTS

The population for this study consisted of professional teacher educators from the member institutions of the University Council for Vocational Education (UCVE). UCVE institutions were selected because they were doctoral granting institutions.

A current listing of teacher educators was requested from each UCVE representative at the eighteen member institutions. Twelve of the institutions responded to the first request and the remaining six responded to a follow up letter. Names that appeared on the lists were entered into a database with a final count of 278 teacher educators. This population was used as the sample.

METHODOLOGY

INSTRUMENTATION

The instrument used was a researcher-generated questionnaire. The instrument was designed to measure both the current usage and the perceived importance of various microcomputer applications. The applications included were:

- Accounting Packages
- Bibliographic Search
- CAI Authoring Systems
- CMI Packages
- Desktop Publishing Packages
- Electronic Spreadsheets
- Graphics Programming
- BASIC Programming
- CAD/CAM
- CAI Programming Languages
- Data Base Management Packages
- DOS & System Commands
- Expert Systems
- Interactive Video Authoring Systems

- Networking Packages
- Project Management/Planning Packages
- Word Processing
- Presentation Production Packages
- Statistical Packages

A glossary of terms was developed so that participants would respond to questions using the same definitions of microcomputer applications. Definitions were used to eliminate any confusion about applications since they refer to software titles rather than categories of applications.

For each of the applications, the subject was asked to indicate whether or not he/she used the application, with a yes/no response. In addition, the subject was asked to indicate the perceived importance of the application in regard to faculty training and/or graduate student curriculum. A Likert type scale, with 0 being no opinion, 1 being least important and 5 being most important was used to record ratings of computer applications.

PROCEDURE

The initial response to the package produced a return of 178 instruments (64%). A follow up letter and questionnaire were sent to non-respondents after a period of six weeks. The response to this second mailing resulted in an additional return of 50 instruments within three weeks. Of the 228 instruments returned, 16 were not completed satisfactorily and were eliminated. Removal of these 16 records provided a final count of 212 (74%) instruments to be used in the data analysis.

Later a Faculty Directory was published by the UCVE. Each faculty member was identified with their research interest and "service area" i.e., Agriculture, Business, Trades and Industries, Industrial Education, Technical Education, Adult Education, etc. The names of faculty

members were coded by their service area affiliation for grouping and analysis of data. Figure 1 shows the percentage of repondents by service area.

DATA ANALYSIS

APPLICATIONS CURRENTLY USED

The first objective of this study was to identify the microcomputer applications currently used by vocational-technical education faculty. The respondents were asked to indicate whether or not they used a particular application by circling a Y or N on the instrument. A tally was made of these yes/no responses. Respondents not indicating their usage of an application were counted as non-users. Reported use of the applications contained in the instrument is summarized in Table 1. As the rank order of usage in Table 1 shows, the applications used by a majority (over 50%) of the respondents are 1. Word Processing, 2. Statistical Packages, 3. DOS

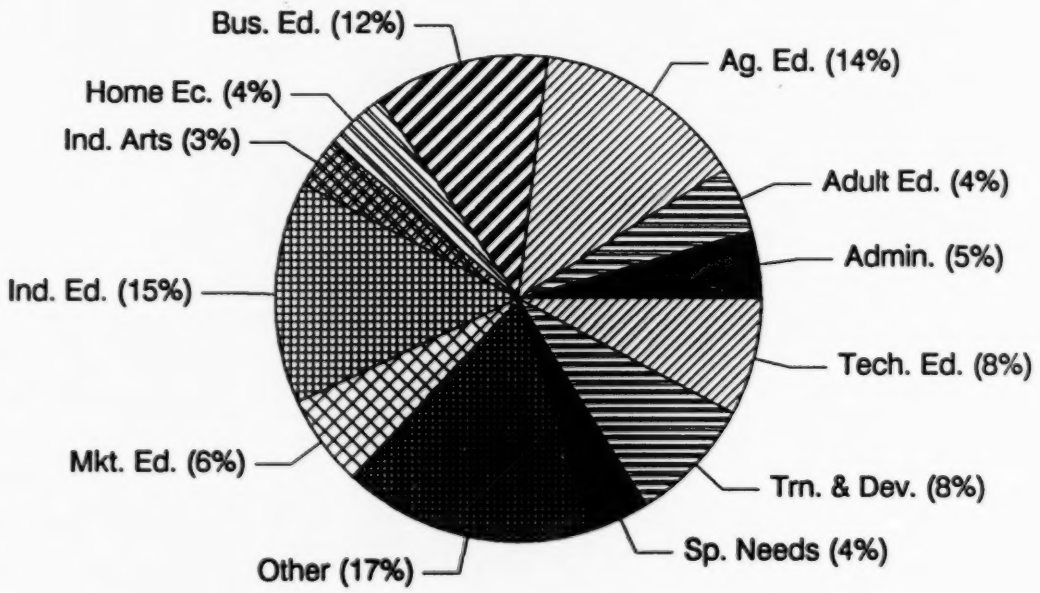

Figure 1 - Percentage of Respondents by Service Area

Table 1 - Rank Order of Use of Microcomputer Applications by University Council for Vocational Education Faculty Members

Application	Users	Non-Users	Percent Users
Word Processing	193	19	91%
Statistical Packages	146	66	69%
DOS & System Commands	144	68	68%
Bibliographic Search	140	72	66%
Data Base Management	133	79	63%
Electronic Spreadsheets	130	82	61%
Desktop Publishing Packages	117	95	55%
Graphics Programming	89	123	42%
Networking Packages	79	133	37%
BASIC Programming	73	139	34%
Presentation Production Packages	71	141	33%
CAD/CAM	57	155	27%
CAI Authoring Systems	55	157	26%
Accounting Packages	50	162	24%
CMI Packages	46	166	22%
Project Management/Planning Packages	43	169	20%
Interactive Video Authoring Packages	32	180	15%
CAI Programming Languages	31	181	15%
Expert Systems	22	190	10%

& System Commands, 4. Bibliographic Search, 5. Data Base Management, 6. Electronic Spreadsheets and 7. Desktop Publishing Packages. Word processing was the most used application (91%). Only one of ten teacher educators do not use a computer for word processing.

PERCEIVED NEEDS

The second and third objectives of this study were to identify (2) and prioritize (3) perceived needs in microcomputer applications for vocational-technical education faculty. Each respondent was asked to indicate the importance of each application on the instrument by circling a value from 1 to 5, with 1 being least important and 5 being most important. Respondents not wishing to express an opinion were allowed to circle a 0 to indicate no opinion. For each application, the responses (other than no opinion) were treated for a mean value.

The perceived importance of the applications as reported by the respondents is summarized in Table 2. Again, word processing was perceived to be most important. It is interesting to note that the 7 applications used by the majority of the subjects appear in the 9 highest rated applications. Additionally, when both user and non-user responses are combined, the same 7 applications are perceived important for faculty training and graduate student curriculum needs.

A mean of means was calculated to be 3.44. Any value above 3.44 was considered positive and important to the respondents as a potential computer application. Word Processing, Bibliographic Search, Statistical Packages, Desktop Publishing, Data Base Management, DOS, Spreadsheets, Presentation Production and Networking Packages were considered most important. The least important application to vocational teacher educators was CAI Programming Languages. In fact, all categories related to computer aided instruction were not

Table 2 - Ordered Mean Ratings of Microcomputer Application Importance as Perceived by University Council for Vocational Education Faculty Members

Application	Users (n)	Non-Users (n)	Combined
Word Processing	4.725 (193)	4.313 (19)	4.693
Bibliographic Search	4.355 (140)	3.549 (72)	4.138
Statistical Packages	4.141 (146)	3.875 (66)	4.074
Desktop Publishing Packages	4.096 (117)	3.671 (95)	3.935
Data Base Management	4.038 (133)	3.396 (79)	3.886
DOS & System Commands	4.099 (144)	3.050 (68)	3.867
Electronic Spreadsheets	4.040 (130)	3.082 (82)	3.770
Presentation Production Packages	3.957 (71)	3.275 (141)	3.569
Networking Packages	3.842 (79)	3.326 (133)	3.560
Interactive Video Authoring Packages	3.710 (32)	3.143 (180)	3.260
Graphics Programming	3.640 (89)	2.734 (123)	3.206
CAI Authoring Systems	3.547 (55)	3.000 (157)	3.195
Project Management/Planning Packages	3.585 (43)	2.973 (169)	3.139
CMI Packages	3.689 (46)	2.892 (166)	3.136
CAD/CAM	4.094 (57)	2.394 (155)	3.007
BASIC Programming	3.243 (73)	2.505 (139)	2.818
Accounting Packages	3.714 (50)	2.362 (162)	2.792
Expert Systems	3.318 (22)	2.657 (190)	2.774
CAI Programming Languages	3.267 (31)	2.409 (181)	2.593

high on perceived importance. CAD/CAM applications were understandably low in perceived importance since this is a technology and not a function of teacher education. Moreover, accounting packages are used mostly in business education. Project Management, BASIC and Expert Systems, while they cross fields of expertise, were not considered important to vocational teacher educators.

Again, if one looks at the applications most often used and perceived as most important, they are: Word Processing, Bibliographic Search, Statistical Packages, Desktop Publishing Packages, Data Base Management, DOS & System Commands, and Electronic Spreadsheets. With the exceptions of Desktop Publishing and Statistical Packages, these 7 applications form a "core" of areas which the microcomputer user must be highly skilled. Use of DOS & System Commands allows the user to control the machine and access the information stored in auxiliary memory. Word Processing, Data Base Management, and Electronic Spreadsheets allow the user to manipulate text, information and numbers respectively. Bibliographic Search provides a means for accessing a variety of data. Considering the research orientation of faculty members and graduate students, the inclusion of Statistical Packages is not surprising. Neither is the inclusion of Desktop Publishing, since everyone wants their research results to "look good."

RELATIONSHIPS BETWEEN USER AND NON-USER RESPONSES

During the data analysis an additional question arose. Is there a relationship between the use of each microcomputer application and the perceived importance of that application? To answer this question, a chi-square test of independence was applied. The following hypothesis was tested at the .05 level.

> There is no significant relationship between the use/non-use and perceived rating of importance.

The chi-square test of independence revealed that there was no relationship between the use/non-use of applications and perceived importance for Word Processing, Statistical Packages, Interactive Video Authoring Packages, CAI Authoring Packages and Expert Systems. Table 3 shows the chi-square values calulated for each of the applications.

There were significant relationships found for the fourteen remaining applications and usage. For the following applications, the perceived importance was related to use: Bibliographic Search, Desktop Publishing, DOS, Data Base Management, Spreadsheets, Presentation Production, Networking, Graphics Programming, Project Management/Planning, CMI, CAD/CAM, BASIC Programming, Accounting and CAI Programming. The contingency coefficient has been given in Table 3.

A chi-square test of independence was performed to test the following hypothesis:

Table 3 - Summary of Chi-Square Values with Contingency Coefficients for Significant Values

Application	Chi-Square	Contingency Coefficient*
Word Processing	9.778	
Bibliographic Search	33.309	0.387
Statistical Packages	5.475	
Desktop Publishing Packages	14.781	0.273
DOS & System Commands	28.576	0.369
Data Base Management	20.008	0.317
Electronic Spreadsheets	27.204	0.323
Presentation Production Packages	18.316	0.326
Networking Packages	12.939	0.267
Interactive Video Authoring Packages	6.647	
Graphics Programming	24.694	0.361
CAI Authoring Systems	9.467	
Project Management/Planning Packages	12.614	0.278
CMI Packages	17.164	0.323
CAD/CAM	45.064	0.484
BASIC Programming	12.244	0.263
Accounting Packages	36.824	0.439
Expert Systems	8.096	
CAI Programming Languages	19.990	0.353

* Significant at x^2 (0.5) = 11.1 (4 degrees)

> There was no significant relationship between those using microcomputer applications and their overall perceived importance.

The individual responses for each application were summed to provide a total response rating for both users and non-users. The null hypothesis was tested at the .05 level. The hypothesis was rejected. A relationship did exist between the users of microcomputer applications and their perceived importance. Teacher educators who used computers perceived their importance to be higher.

The fourth objective was to determine if there were differences between the various service area faculty in their usage and perceived importance of microcomputer applications. The chi-square test of two independent samples was used to test the following hypothesis:

> There were no significant differences between the faculty of the various vocational-technical service areas and usage of microcomputers.

The hypothesis was rejected at the .05 level of confidence. There was a significant difference between the faculty of the various service areas in their usage of microcomputers. Figure 2 provides a comparison of means of percentage of usage for faculty of the various service areas. Industrial Arts faculty members used microcomputers most often (64%) and Home Economics faculty members used microcomputers the least (24%). The mean usage for vocational-technical faculty was 41.73%.

The following hypothesis was used to test the perceived importance of microcomputer applications of the various service area faculty:

> There was no significant difference between the various service areas faculty's perceptions of the importance of microcomputer applications.

The hypothesis was rejected at the .05 level using the chi-square test of independence. Figure 3 provides a summary of the perceived importance for microcomputer applications for the various service area faculty members. The overall mean rating was 3.47. Home Economics

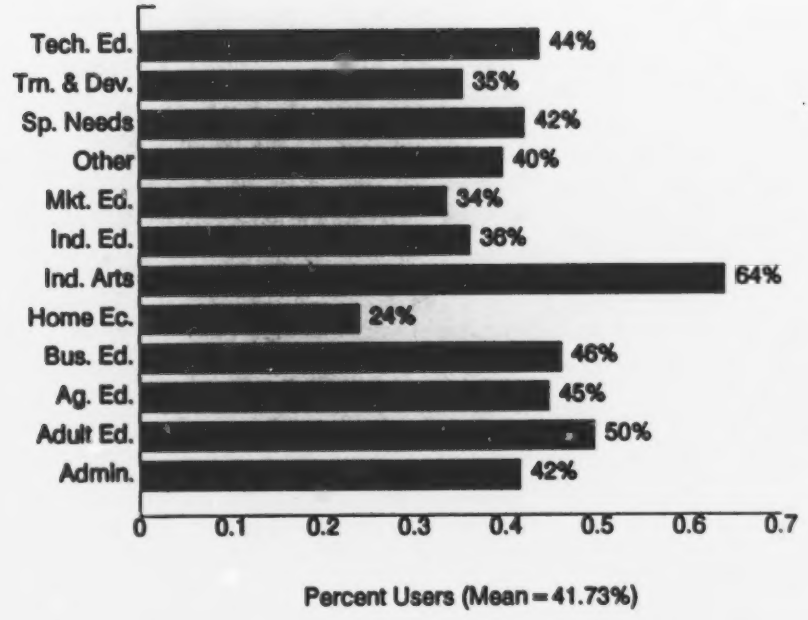

Figure 2 - Percentage of Microcomputer Application Users by Faculty Service Area

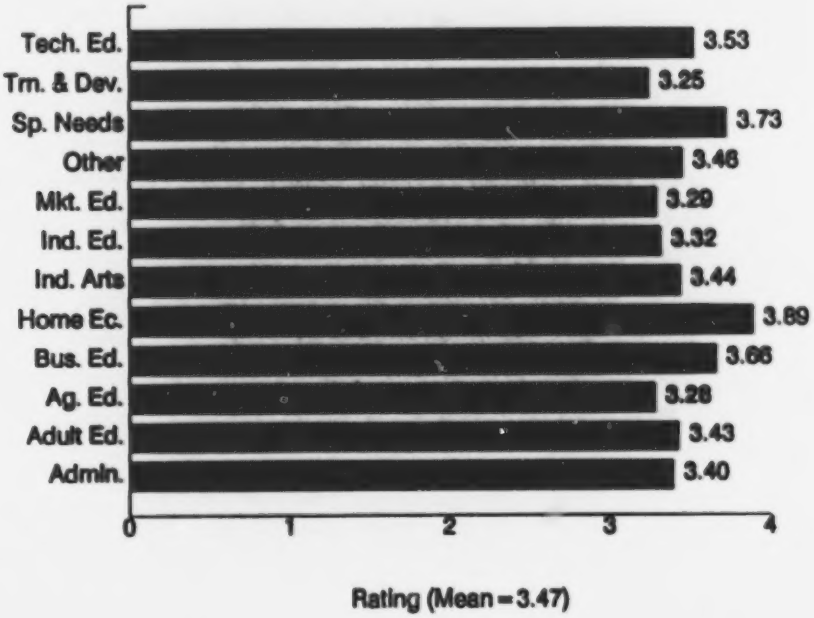

Figure 3 - Means for Perceived Importance of Microcomputer Applications by Faculty Service Area

professors perceived microcomputers to be more important (3.89) than other service area faculty. This is in contrast to their using microcomputers since they had the lowest percentage of users in the various faculty service areas. Training & Development professors had the lowest perceived importance of microcomputers (3.25).

Table 4 provides a summary of the means of the perceived importance of microcomputer applications for the teacher educators of the different service areas of vocational-technical education. Home Economics teacher educators had the highest ratings on 8 of the computer applications. They perceived Bibliographical Search (4.88), CAI Programming (3.75), Database Management (4.5), Graphics Programming (4.6), Networking Packages (4.4), Presentation Packages (4.17), Project Planning/Management (4.25) and Statistics Packages (4.71) more important than other service area faculties

As expected, Business Education professors had the highest means for Accounting Packages (3.67), DOS/System (4.42), Spreadsheets (4.43), and Word Processing (4.92). Technical Education professors had the highest means for CAD/CAM (4.15) and Expert Systems (3.5). Special Needs professors had the highest perceived means on CAI Programming (4.0) and Desktop Publishing (4.71). Adult Educators had the highest perceived mean on Interactive Video applications (4.14) and Agriculture Education professors had the highest ratings for Computer Managed Instruction (3.48).

When the mean perceived importance for applications were ranked within each service area, the "core" applications usually fell above that service area mean. However, Training & Development professors ranked Spreadsheets (3) below their mean of 3.25. Additionally, Industrial Arts faculty ranked both Statistical Packages (3.25) and Data Base Management (3.2) below their mean of 3.44. With these exceptions, all "core" applications were ranked above the mean within each service area.

Table 4 - Summary of Means of Perceived Importance of Microcomputer Applications by Faculty Service Area

	Admin.	Adult Ed.	Ag. Ed.	Bus. Ed.	Home Econ.	Ind. Arts	Ind. Ed.	Mkt. Ed.	Other	Spec. Needs	Trn. & Dev.	Tech. Ed.
Accounting Pkg.	3.22	3.00	2.86	3.67	2.40	3.00	2.36	2.44	2.79	2.88	2.25	2.33
BASIC Programming	2.67	2.50	2.21	3.04	2.50	2.40	3.00	2.82	3.08	2.86	3.00	3.07
Biblio. Search	3.80	3.89	4.28	4.29	4.88	4.00	4.18	4.67	4.03	4.29	3.65	3.85
CAD/CAM	2.83	2.88	2.09	3.13	2.00	3.80	3.17	2.33	3.32	4.00	2.40	4.15
CAI Authoring Sys	3.00	3.13	2.96	3.19	3.75	3.00	3.10	2.90	3.33	4.00	3.58	3.08
CAI Programming	2.75	2.57	2.19	2.45	3.75	2.33	2.65	2.00	3.00	2.33	2.82	2.73
Comp. Mng. Instr.	3.00	3.29	3.48	3.10	3.40	3.33	2.74	3.08	3.35	2.80	3.17	2.90
Database Mgt.	4.11	3.63	4.00	4.36	4.50	3.20	3.67	4.10	3.60	3.57	3.73	3.85
Desktop Publish.	3.67	3.67	3.50	4.21	4.67	4.20	4.00	4.09	3.81	4.71	3.54	4.31
DOS/System Comm.	4.00	3.88	3.96	4.42	4.29	3.83	3.56	3.55	3.73	4.14	3.75	3.57
Spreadsheets	4.00	3.57	4.18	4.43	4.00	4.00	3.34	3.67	3.44	4.00	3.00	3.75
Expert Systems	2.50	3.14	2.40	2.83	3.40	3.00	2.67	2.20	2.64	2.75	2.78	3.50
Graphics Prog.	3.11	3.57	2.68	3.67	4.60	3.60	2.87	2.70	3.32	3.67	2.92	3.36
Interactive Video	3.14	4.14	3.04	3.37	3.40	3.25	3.13	3.11	2.91	3.83	3.45	3.50
Networking Pkg.	3.56	3.75	3.63	3.86	4.40	3.80	3.16	3.11	3.63	3.88	3.36	3.33
Presentation Pkg.	3.29	3.38	3.29	3.75	4.17	3.50	3.48	3.30	3.79	3.86	3.55	3.58
Project Plan/Mgt	3.00	3.11	2.65	3.11	4.25	3.25	3.35	3.50	2.96	3.86	2.77	3.42
Statistics Pkg.	4.50	3.56	4.39	3.80	4.71	3.25	3.90	4.33	4.06	4.57	3.77	4.08
Word Processing	4.40	4.56	4.57	4.92	4.89	4.67	4.77	4.67	4.86	4.88	4.18	4.67
Means by Service Area	3.40	3.43	3.28	3.66	3.89	3.44	3.32	3.29	3.46	3.73	3.25	3.53

Faculty members in all service areas rated "non-core" applications above the mean. In the Administration service area, Networking (3.56) was rated above the mean (3.4). Adult Education faculty members rated Interactive Video (4.14), Networking (3.75), and Graphics Programming (3.57) above the mean (3.43). Faculty in Agricultural Education rated Networking (3.63), CMI (3.48), and Presentation Packages (3.29) above the mean (3.28). Business Education faculty rated Networking (3.86), Presentation Packages (3.75), Accounting (3.67), and Graphics Programming (3.67) above the mean (3.66). Faculty members in Home Economics rated Graphics Programming (4.6), Networking (4.4), Project Planning (4.25), and Presentation Packages (4.17) above the mean (3.89). Industrial Arts professors rated CAD/CAM (3.8), Networking (3.8), Graphics Programming (3.6), and Presentation Packages (3.5) above the mean (3.44). Professors in Industrial Education rated Presentation Packages (3.48) and Project Planning (3.35) above the mean (3.32). Marketing Education faculty rated Presentation Packages (3.3) and Project Planning (3.5) above the mean (3.29). Special Needs faculty rated CAI Authoring Systems (4), CAD/CAM (4), Project Planning (3.86), and Interactive Video (3.83) above the mean (3.73). Faculty in Training & Development rated CAI Authoring Systems (3.58), Presentation Packages (3.55), Interactive Video (3.45), and Networking (3.36) above the mean (3.25). Technical Education professors rated CAD/CAM (4.15), and Presentation Packages (3.58) above the mean (3.53).

IMPLICATIONS

Based on the findings of the study the following conclusions were reached that could impact upon computer offerings that prepare graduate students for their roles as teacher educators.

1. The following applications, which are standard in business and industry, should be the "core" of computer course(s) for preparing teacher educators. They are: Word Processing, Bibliographic Search, Statistical Packages, Desktop Publishing, Data Base Management, Spreadsheets, and DOS & System Commands. No matter which service area students will work in after graduation, these applications should be learned before or during graduate studies.

2. Graduate students that perceive computer applications as not important probably have little previous experience using the applications.

3. Traditional offerings for both faculty development and graduate programs have focused upon BASIC Programming and CAI which are perceive as not important and of little use.

4. Students preparing for faculty positions in specific service areas should receive additional training in microcomputer applications according to use and perceived importance of incumbent faculty in these service areas.

LIST OF REFERENCES

Battista, M. T. & Krockover, G. H. (1984). Microcomputer education of college faculty. Collegiate Microcomputer, 2, 97-100.

Cheek, H. N. & Campbell, N. J. (1984). A model for introducing the microcomputer to educators. Collegiate Microcomputer, 2, 51-55.

Garson, D. G. (1985). Technological innovation in higher education a note on microcomputing. Collegiate Microcomputer, 3, 369-374.

King, K. M. (1985). Evolution of the concept of computer literacy. Educom Bulletin, 20(3), 18-21.

McHenry, H. & Franklin, S. (1986). Microcomputer in-service training for university faculty and staff: A case report. Collegiate Microcomputer, 4, 173-178.

Slatta, R. W. (1986). Database and filing software for scholars. Collegiate Microcomputer, 4, 307-319.